Piezoresistive strain sensing using carbon nanotube forests suspended by Parylene-C membranes

Abstract:

We present a strain gauge that uses a carbon nanotube (CNT) forest, partially embedded in a Parylene-C membrane, as a piezoresistor. The device exhibits high sensitivity with a gauge factor of 4.52 or higher for strains up to ~1.5, offering much higher sensitivity in the strain range than those reported for other types of CNT-forest/polymer composite piezoresistors. The gauge also shows a linear response to bending strains generated by forces applied perpendicularly to the membrane with a 55-ppm/mN sensitivity. These findings suggest promising characteristics for a variety of sensing applications of the CNT-forest/Parylene film.